LIGHT FOR OFFICES AND COMMUNICATION

ZUMTOBEL

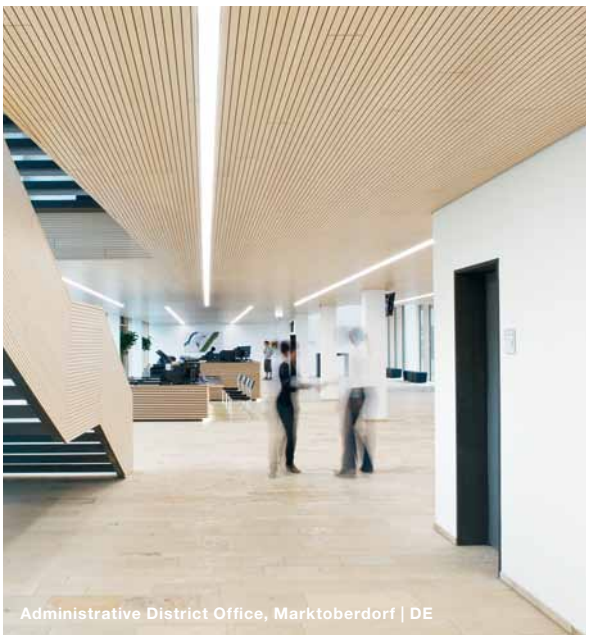
Light for offices and communication

“Human factors” are at the heart of contemporary office concepts and hence interior design and office lighting. High-quality lighting enhances the perceived attractiveness of spaces and workplaces, boosts motivation and aids concentration. Zumtobel is an experienced office lighting specialist. Over many years we have amassed extensive knwowledge and expertise in using light in offices. We use the results of research studies on how light affects motivation, user acceptance and a sense of well-being in order to continuously refine our products. Lighting solutions by Zumtobel create working conditions that make people feel good, thus motivating them and helping them concentrate on doing their job. Visual tasks must be identified optimally and without distraction. Intelligent lighting control systems and smart luminaires can be used to alter the colour temperature and intensity of light in ways that work in harmony with human biological rhythms. At the same time, using innovative technologies and control systems makes it possible to cut energy consumption. This is how Zumtobel strikes a balance between lighting quality and energy efficiency.

Zumtobel. The Light.

Applications

Seat Pagine Gialle, Turin | IT



Administrative District Office, Marktoberdorf | DE

Google Headquarters, London | GB

Deutsche Bank, Frankfurt am Main | DE

Harenberg City Center | DE

R Tech Sa, Liège | B

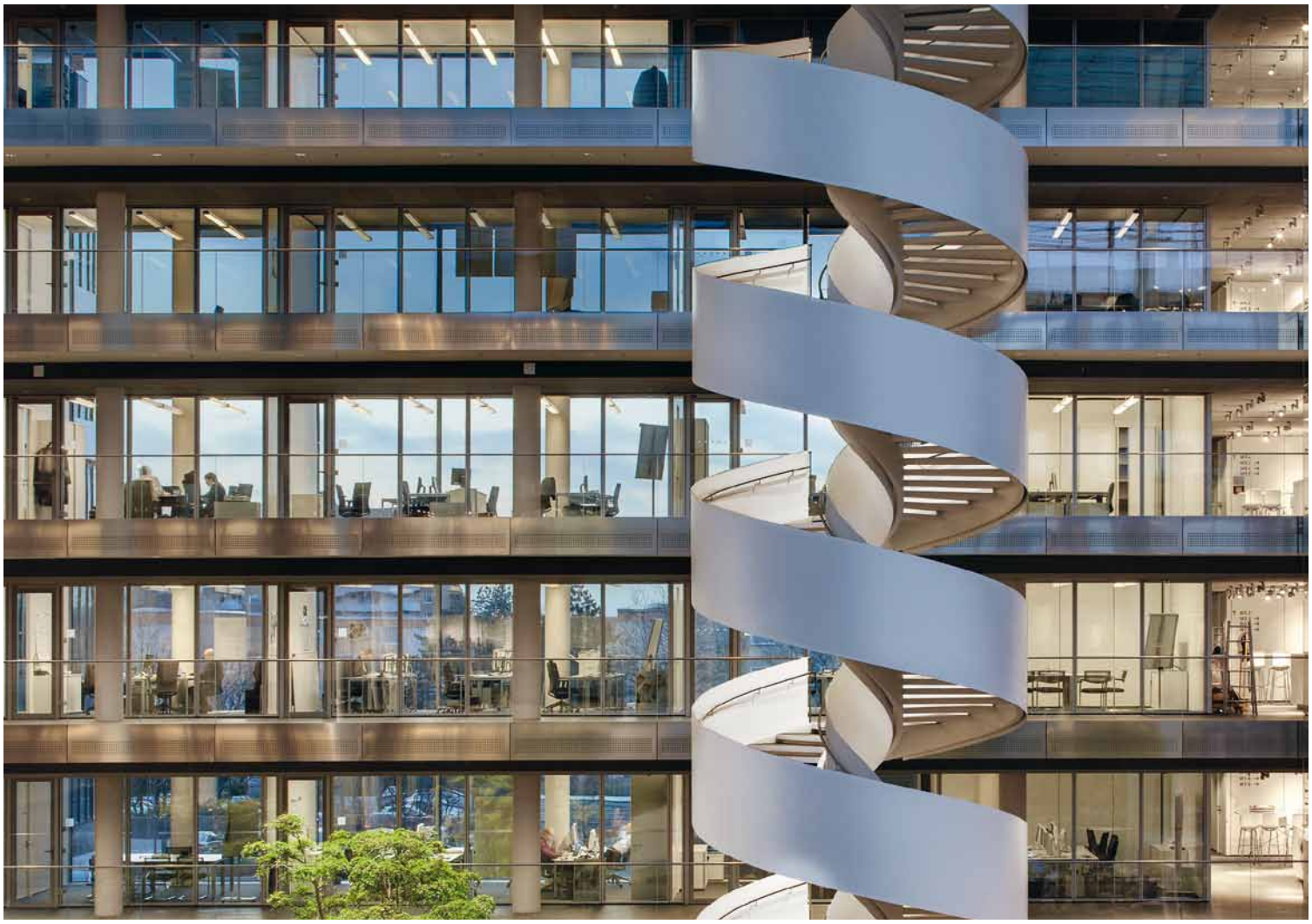
Buro Happold, Bath | GB

Xella International GmbH, Duisburg | DE

References

Administrative District Office, Marktoberdorf, DE / Alexander Bürkle GmbH & Co. KG, Freiburg, DE / Angel Building, London, GB / AOL, London, GB / Bewag, Eisenstadt, AT / Brasseler, Lemgo, DE / Buro Happold Offices, Bath, GB / Cabel, Empoli, IT / Consorzio dei Comuni Trentini, Trento, IT / Deutsche Bank, Frankfurt am Main, DE / Dr. Preyer, Dr. Burgstaller legal firm, Vienna, AT / Emporio Tower, Hamburg, DE / Energie AG, Linz, AT / EPR Architects, London, GB / Grey Headquarters, Düsseldorf, DE / Harenberg City Center HCC, Dortmund, DE / Hartung, Neumünster, DE / HDI Gerling, Hannover, DE / Hörmann Austria, Dobel, AT / Huawei Building Complex, Shanghai, CN / Ingenieurbüro Hausladen, Kirchheim-Heimstetten, DE / LVM Insurance Company, Münster, DE / Network Rail – The Mailbox Office, Birmingham, GB / Offices of Seat Pagine Gialle, Turin, IT / Parker Hannifin, Bielefeld, DE / Passport and Patent Office, Aarau, CH / Plaza 66, Shanghai, CN / Polipol, Diepenau, DE / Raiffeisenbank Nenzing, AT / Ropemaker Place, London, GB / R Tech Sa, Liège, B / Schletter Leichtmetallbau GmbH, Kirchdorf, DE / Schmidt Group, Coesfeld, DE / Stiftskaserne Sappeurtrakt, Vienna, AT / Swarovski Headquarters, Zurich-Männedorf, CH / Swiss Ornithological Institute, Sempach, CH / Swisspro, Zurich, CH / TechnoAlpin AG, Bolzano, IT / Town Hall, Hainfeld, AT / VHV office building, Hanover, DE / Vocational College, Mülheim, DE / Volksbank AG Headquarters Vienna, AT / Wiener Städtische Insurance Group, Vienna, AT / Xella International, Duisburg, DE

Photo on front cover: HDI Gerling, Hannover | DE
Architects: ingenhoven architects, Düsseldorf | DE
Lighting solution: ECOOS pendant luminaires, PERLUCE moisture-proof luminaires, MIRAL louvre luminaires, LINARIA light lines, ONLITE RESCLITE emergency luminaires



Research studies
People, the environment and innovation

What attributes characterise a lighting concept that creates perfect visual conditions, fosters a sense of well-being and boosts motivation? Do the same quality parameters apply to LED lighting? And which lighting control makes most sense in terms of energy?

These and many other questions are regularly asked by Zumtobel during the development of product and application concepts. In order to get the right answers, Zumtobel carries out applied lighting research in collaboration with independent partners.

Several studies involving Zumtobel are currently investigating the effects of light and ways of implementing holistic customer requirements in appropriate lighting solutions.

Well-being, job performance and circadian rhythms
Many trials have proven the effects of workplace lighting on human day/night rhythms and various psychometric factors. But what are the measurable benefits of a chronobiologically optimised lighting situation compared with conventional office lighting? Which lighting rhythms can heighten a sense of well-being and improve job performance?

Zumtobel fitted out comparable office spaces with dynamic lighting solutions that made it possible to vary the light colour and light intensity in order to measure and document various lighting concepts in terms of their impact on people. Three aspects were examined in order to obtain overall assessment of their effects on human health: psychological (well-being and job satisfaction), physical (heart rate variability and sleep quality) and cognitive (job performance and ability to concentrate). Absenteeism rates were also included. The results of this work will become available in 2012.

HUMAN RESEARCH

Medical University of Graz

The short-term effects of light provided by lighting systems varying in light colours and intensity levels are being investigated in two identical laboratory rooms that differ only in terms of lighting (fluorescent lamps as opposed to LEDs) with the aid of questionnaires, concentration and performance tests and physiological measurements.

Do LEDs change things?
Numerous trials that concentrate primarily on investigating the influence of lighting on human health and well-being have been conducted in recent years. Most of these experiments were carried out using conventional light sources such as fluorescent lamps. Lighting parameters such as illuminance and colour temperature were varied and their effect on the mental state and productivity of the subject group and user acceptance of the lighting system were determined.

Zumtobel is now examining the extent to which such results are transferable to LED office lighting and the impact that a dynamic LED lighting solution has on employees' productivity, motivation and well-being. This study, which is being conducted under the aegis of the Centre of Lighting Expertise, is taking place in two stages: the short-term effects of light are being investigated in the laboratory and long-term effects are being determined in field trials in real office spaces. The study is being supported through the Competence Centre for Excellent Technologies (COMET) by the Federal Ministry for Transport, Innovation and Technology, the Federal Ministry of Economy, Family and Youth and the Austrian federal regions of Vorarlberg, Tyrol and Burgenland. The project is being managed by the Austrian Research Promotion Agency (FFG).

KOMPETENZZENTRUM
LiCht

Room climate and energy consumption
VERU 3, a research project set up by the Fraunhofer Institute for Building Physics, is carrying out an assessment of innovative façade solutions. Heat gain, heat loss and the thermal comfort of daylight and artificial lighting concepts deployed in conjunction with solar shading systems are being sampled and measured during the course of comparative experiments.

Bringing lighting and innovative façade and solar shading technologies together in an energy-efficient manner is a priority for Zumtobel. This project is being supported by several partners and is expected to yield its first results in 2012.

Fraunhofer IBP HELLA somfy.

Various control strategies, control sensors and daylight algorithms are being trialled in the Fraunhofer Institute's test facility in this search for maximum efficiency.

Trends
Light for offices and communication

Working and feeling at ease

Employees as a success factor
The performance of a company's employees and therefore its long-term success are based on a positive working atmosphere. Appropriate conditions are provided by new office worlds and architectural concepts. Mandatory recuperation periods during working hours and company-provided leisure activities are already features of HR policy in many companies. Due to demographic changes and shortages of skilled staff, many sectors have started to tout for good employees. Innovative organisational and spatial layout measures are an effective way of inspiring qualified staff and ensuring long-term staff retention.

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Technology and flexibility

Working environments of the future
The notion of work/life balance is a symbol of the change of paradigm in the working world of the 21st century. Thanks to innovative technologies, people's working environments and private lives are no longer strictly demarcated. Flexible working hours and work locations increase employees' freedom and self-determination, allowing for maximum individuality. They are hence among the key aspects that make people identify with their job and employer. Ever-changing organisational structures and shifting key areas of activity are associated with flexible office space architectures that can adapt quickly and efficiently to meet users' preferences.

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Effectiveness and efficiency

The sustainability principle
Sustainability is an increasingly important principle of business activity. A concept that can be brought to life and therefore made sustainably successful needs motivated, highly aware employees more than anything else. A balanced relationship between good quality of life and an energy-efficient ways of thinking and working may therefore be assumed. An integrated approach to architectural design – starting with the selection of furnishings and facilities and efficient use of lighting during working hours right through to disposal at the end of a life-cycle – lays the foundation for greater sustainability in office working environments.

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Working and feeling at ease

“The purpose of offices is to facilitate processes and provide people with appropriate room layouts in which they can work productively and effectively while remaining healthy and feeling at ease. Offices also cost lots of money. However, staff costs account for over 80 % of total costs. Trying to make savings in the wrong area can be dangerous. If, for example, the acoustics and lighting in an office are poor, this inevitably results in reduced productivity. Basically, employees cannot be motivated and creative unless they feel at ease. Investment that safeguards the well-being of staff pays for itself quickly.”

Prof. Dieter Lorenz
Social Sciences and Cultural Studies Faculty,
Central Hesse University of Applied Sciences | DE

Google Headquarters, London | GB
Architects: Penson, London | GB
Interior design and photo: Penson, Anna Pizzey, London | GB
Lighting solution: SCONFINE SFERA pendant luminaires, SLOTLIGHT light lines, PANOS INFINITY downlights

Inextricably interwoven work environments and living spaces are making new demands on office workplace lighting. In the 90s, the increasing prevalence of display screens focussed attention on lighting's visual task. The challenge was to accentuate contrast and avoid reflected glare. Innovative lighting concepts not only achieve this technical feat, they also provide emotive impact: they deliver pleasant lighting scenes that make it easier to identify with one's work task and surroundings.

Intelligently controlled, dynamic lighting is used as a room-changing component that achieves an intangible impact. The right light at all times and for every activity is absolutely crucial. Feelings such as a sense of openness or closedness, superiority or inferiority can be aroused in a room.

Lighting design is also increasingly focusing on the biological function of light. Hormonal processes stabilise our internal body clock. Bright, cool light act as a daytime and hence waking cue, softer, warmer light in the evening encourages onset of the sleep phase. Innovative approaches to artificial lighting used in conjunction with natural light can therefore foster a sense of well-being and promote health.

1 Working and feeling at ease
Making work easier

- **Lighting that is appropriate for a particular visual task improves visual performance**
- **Lighting quality in excess of standard requirements promotes well-being and reduces distractions**
- **A correctly used, modern LED solution is an intelligent alternative to conventional lighting systems**

Recommended products

AERO II | Waveguide luminaire

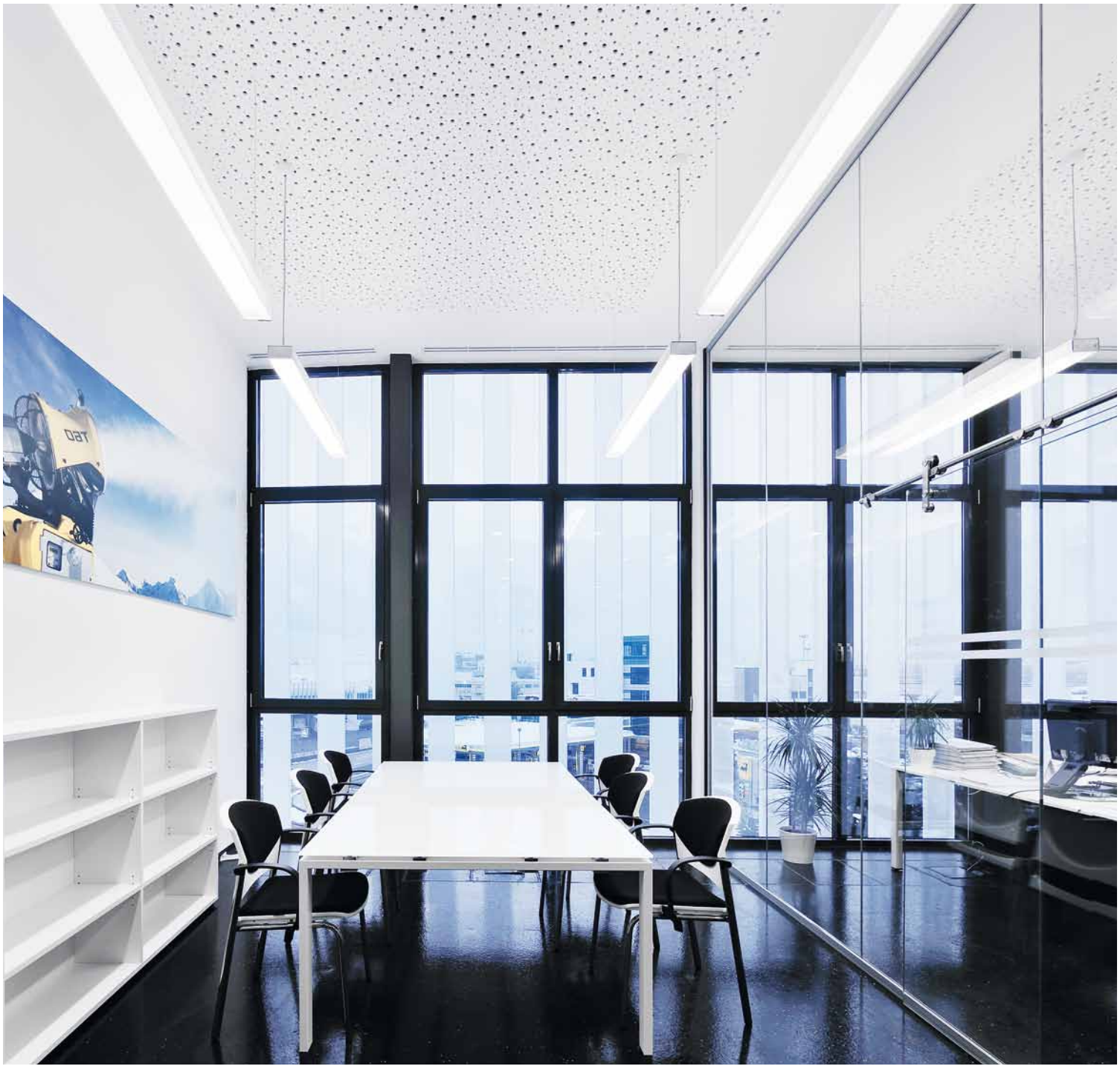
DIMLITE | Lighting management

Day-to-day office life has changed drastically in recent years. The diverse range of activities performed has brought variety to office life. People no longer just work at their desk, they also work in conference rooms, hotels or on trains. The ability to recognise and structure a visual task straightforwardly is a basic prerequisite for being able to concentrate and work in a motivated fashion. Good light is needed in order to see properly without distraction. It improves visual performance and visual comfort. Lighting design is primarily geared towards the requirements specified in European Standard EN 12464-1. The standard defines illuminance levels for the work plane, wall and ceiling for various visual tasks with well-balanced light distribution, and sets out specifications for contrast and glare control.

The requirements placed on lighting become more exacting the more difficult the visual task is. Where particularly small, low-contrast objects are processed or colours are checked, higher lighting levels with appropriate light distribution or excellent colour rendering make work easier. Besides luminaires with good glare control, combined daylight and blinds management helps avoid distracting reflections on display screens. This controls the amount of incoming daylight.

A pleasant working environment encourages positive emotions in the workplace. Even general lighting with direct and indirect components enhances visual ambience. Pleasant shadows improve modelling and therefore the perceived three-dimensionality of objects in a room. Well-balanced cylindrical illuminance levels aid facial recognition and encourage communication. Uniform vertical lighting brightens up walls and provides atmosphere. Demographic changes will result in the proportion of older employees rising in future. This has consequences for lighting design as well because people need more light as they get older.

Sustainable lighting concepts exploit the benefits of modern LED luminaires. The general dimmability of LEDs means that lighting situations in all areas of activity can be easily adapted to suit requirements while also helping achieve greater energy efficiency. Anti-glare optics prevent multiple shadows or excessively high localised luminance levels. Thanks to their high quality, premium LED luminaires are an intelligent alternative to conventional lighting solutions for general lighting as well as in adjoining areas and for accent lighting.



TechnoAlpin AG, Bolzano | IT
Architects: Arch. Johannes Niederstätter VWN Architects in collaboration with Dr. Roland Baldi, Bolzano | IT
Lighting solution: PANOS downlights, SLOTLIGHT II light lines, ECOOS pendant luminaires, PERLUCE and SCUBA moisture-proof luminaires, COPA high-bay reflector luminaires

1 Working and feeling at ease
Creating an identity

Passport and Patent Office, Aarau | CH
Lighting solution: PANOS INFINITY LED downlights, AERO II pendant luminaires, ONDARIA circular luminaires, DIMLITE daylight lighting management system

Wiener Städtische Insurance Group, Vienna | AT
Electrical design: Aquila Hausmanagement GmbH, Vienna | AT
Lighting solution: SLOTLIGHT II light lines, VAERO surface-mounted luminaires, LIGHT FIELDS LED recessed luminaires, LUXMATE lighting management system, ONLITE RESCLITE and ONLITE ARTSIGN emergency luminaires

- **Attractive room and lighting solutions make it easier to identify with one's company**
- **Pleasant room concepts meet individual needs and provide quiet areas where one can work without interruption**
- **Daylight has a positive effect on motivation and commitment**
- **LED solutions exemplify the spirit of innovation and are an intelligent alternative to conventional lighting solutions**

In the battle to attract highly sought-after talented staff, the winners are firms and companies that offer a working atmosphere in which employees feel instantly at ease and can identify with their employer – thereby making a significant contribution towards the company's success. Architecture, furniture, communications technology and lighting solutions can all be expressions of sustainability. Lighting is not just indispensable for good vision, it also creates an atmosphere. Varied, flexible lighting sequences are far superior to static lighting. Packaged into an overall concept, adjustable lighting solutions cater for the needs of users, operators and investors.

Innovative room and work concepts provide plenty of scope for communication and creativity and are therefore perfectly in tune with modern companies' aspirations to operate as control hubs and think tanks. Flexible lighting solutions put the individual needs of people in the foreground. Integrating daylight has a positive effect on motivation and commitment. Bright, friendly environments foster a sense of well-being. Lighting shapes, lighting structures and balanced light colours add individuality to a workplace and enrich it. If the stylistic idiom and look of a room and its lighting complement each other, this produces a harmonious overall effect.

Recommended products

ONDARIA | Circular luminaire

CIRIA | Control point

1 Working and feeling at ease
Promoting health

- **Light affects the human hormone system and provides the circadian body clock with important time cues: when properly used, light stabilises sleep/wake rhythms**
- **By changing the quantity of light, light colour and direction of light, artificial lighting reinforces the effect of daylight in interiors**
- **By doing so, light has a considerable effect on well-being and boosts motivation and health**
- **LED luminaires have an appropriate light spectrum and allow continuous changes in light colour and brightness levels**

Studies and design concepts are increasingly focusing on the biological effects of light. Light is becoming a health factor, not just a prerequisite for good vision. These approaches concentrate on regulating the balance of the sleep hormone melatonin, stabilising and synchronising the body's circadian rhythm, stimulating higher levels of activity and hence improving alertness. This has proved successful for many years in treating depressive disorders and conditions such as Seasonal Affective Disorder (SAD).
The science behind this: some receptors relay information not only in the neural pathway that is responsible for vision. They also affect the secretion of various hormones. Receptors are especially sensitive in the short-wave spectral region of blue light. High doses of daylight are available at many times of the day and biological lighting concepts are therefore always based on daylight.

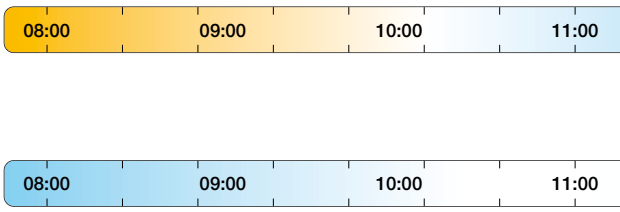
8:00 Warm white light for wallwashers and corridors get the day off to an agreeable start.

10:30 Artificial lighting is turned down as more daylight becomes available and the light colour is made more intermediate

12:00 Just as outdoors, the colour temperature reaches its maximum value at midday

VIVALDI

VIVALDI design software can be used to interactively compose both static and dynamic lighting scenes.

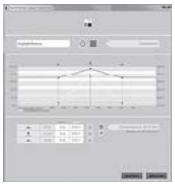


In interiors where there is relatively little daylight, LED technology produces light with sharp peaks in these lower spectral regions and opens up new opportunities. LED light can be highly biologically effective even at relatively low lighting levels. What is more, innovative LED technology provides a tool that can regulate the intensity of light and also adjust the colour temperature. Zumtobel offers continuous variation from warm white to highly biologically effective cool white light in an extensive range of TUNABLE WHITE luminaires. It is possible to stimulate people and improve their well-being and sleep quality by using timelines that run automatically or by individually selecting light components that are biologically effective.

Recommended products

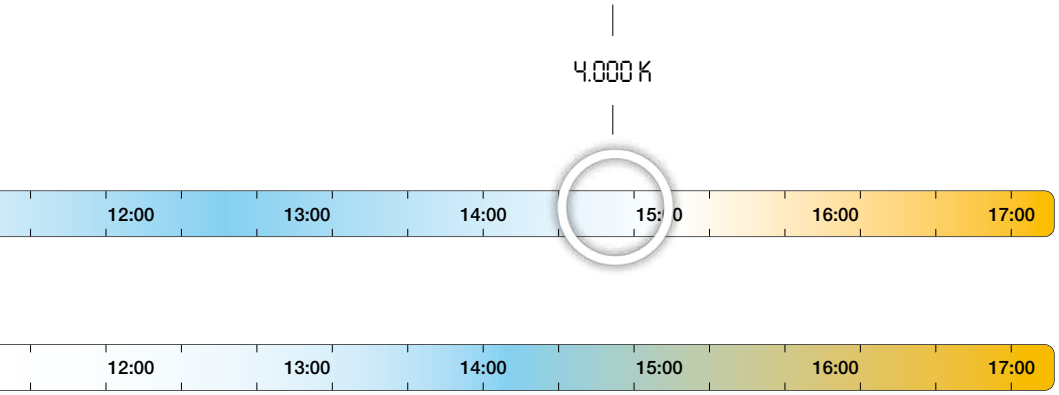
PANOS INFINITY TUNABLE WHITE | LED downlight

LUXMATE LITENET | Lighting management



14:30 Intermediate white corridor and wall-mounted luminaires supplement the general lighting and compensate for low levels of daylight

17:00 When darkness falls, artificial lighting ensures a balanced ratio of warm white light components



These timelines show various ways of modifying colour temperature in a biologically effective manner: the upper timeline and the series of photos show variation that is synced with daylight. On the lower timeline, light is used as a stimulus in the morning and in the evening.

1 Working and feeling at ease
Employees as a cost factor

- **Employees are the most important resource and the biggest cost factor**
- **Investment and operating costs amount to less than a fifth of staff costs**
- **Successful room and lighting solutions work on behalf of employees**

The cost of investing in and operating a lighting installation amount to only a fifth of staff costs. Hence, successful architectural and lighting concepts focus primarily on contented, motivated employees.

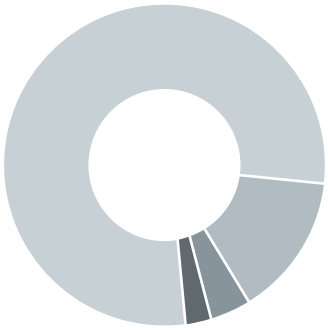
Normative design principles are helpful when it comes to meeting the requirements of visual aspects of light. However, lighting concepts for people involve more than just technical regulations. The interplay of daylight and artificial lighting and the possibility of modifying it have a significant effect on people's well-being. Exploiting this knowledge demands a holistic approach, the framework of which is defined in the architectural concept. Luminaires and lighting scenes are designed in keeping with the way a space is used, a company's corporate identity and the expectations that employees place on their workplace. Maximum satisfaction is achieved when the work environment, and hence the lighting, can be individually configured. The most appropriate light is determined by the particular activity in question and may vary depending on the weather, time of day, season and the employee's sight and age.

Recommended products

ECOOS | Pendant luminaire

PANOS INFINITY WW | LED wallwasher

Swarovski Headquarters, Zurich-Männedorf | CH
Architects: ingenhoven architects, Düsseldorf | DE
Lighting design: Tropp Lighting Design, Weilheim | DE
Electrical design: Jappsen Ingenieure, Oberwesel | DE
Lighting solution: ECOOS pendant luminaires



80 %	staff costs
14 – 15 %	cost of building and floor space
4 – 5 %	cost of equipment, including office equipment
1 – 2 %	setup costs

Source: BSO Verband Büro-, Sitz- und Objektmöbel e.V., Wiesbaden | DE

Technology and flexibility

“Devising a contemporary lighting solution involves performing a balancing act to reconcile sometimes diverging requirements, namely finding a solution that is technically intelligent and aesthetically highly attractive as well as economically sustainable. The finished concept must also be extremely flexible in use.”

Willfried Kramb
Interior designer | a·g Licht Planungsbüro, Bonn | DE

2

Deutsche Bank, Frankfurt am Main | DE
Design architects: Mario Bellini Architects, Milan | IT
Project execution: gmp Architekten von Gerkan, Marg und Partner, Hamburg | DE
Lighting design: a·g Licht, Gesellschaft von Ingenieuren für Lichtplanung, Bonn | DE
Lighting solution: Special blade-shaped luminaire solution, SLOTLIGHT LED light lines, STARFLEX modular lighting system, LOGIC-S lighting system

Technological progress in the field of equipment and display screens is constantly making new demands on the qualities of lighting. Changes in the world of work are also influencing room layouts. Buildings with communication areas and quiet areas or workplaces where there are frequent staff changes call for innovative lighting solutions. However, one thing never changes: lighting design always concentrates on individuals and their various requirements and tasks.

Lighting management ensures the necessary flexibility for task areas and activities. Intuitive operating concepts give each individual freedom to select an appropriate lighting situation that takes into account the equipment used, visual task and mood. It must be possible to adapt lighting situations quickly and flexibly in response to increasingly frequent relocation in the wake of organisational changes. This requirement can be met by appropriate luminaire positioning as well as by luminaire regrouping within the lighting management system. Practical solutions that are successful in the long-term are typically closely coordinated with building management systems.

2 Technology and flexibility
Creating different zones

- **Flexibly used, modifiable task areas are breaking down rigid office and room concepts of the past**
- **Lighting controls make it possible to adapt a lighting situation at the push of a button**
- **In open-plan areas, lighting is used in order to provide structures and orientation**
- **Intelligent control systems divide space up into various daylight zones in order to optimise energy efficiency**

There are fewer and fewer single-person offices in modern work environments. Open-plan areas with flexible task areas are becoming increasingly important. This trend is being encouraged by employees' needs for greater mobility. A suitable lighting solution covers all usage concepts and adapts to prevailing circumstances at the press of a button – simply and easily, thanks to intelligent lighting control. There is no need to rewire luminaires even if areas are rearranged.

Lighting takes on a creative role in open-plan areas: it structures and visually emphasises particular areas, thus making it easier to find one's way around a space. This in turn improves employees' well-being. When presence detectors are used, light is always available when it is actually needed.

Professional lighting management is the simplest and most effective way of using daylight to optimum extent. If an office is split up into various daylight zones, the system operates at maximum efficiency without restricting users' individual configuration choices.

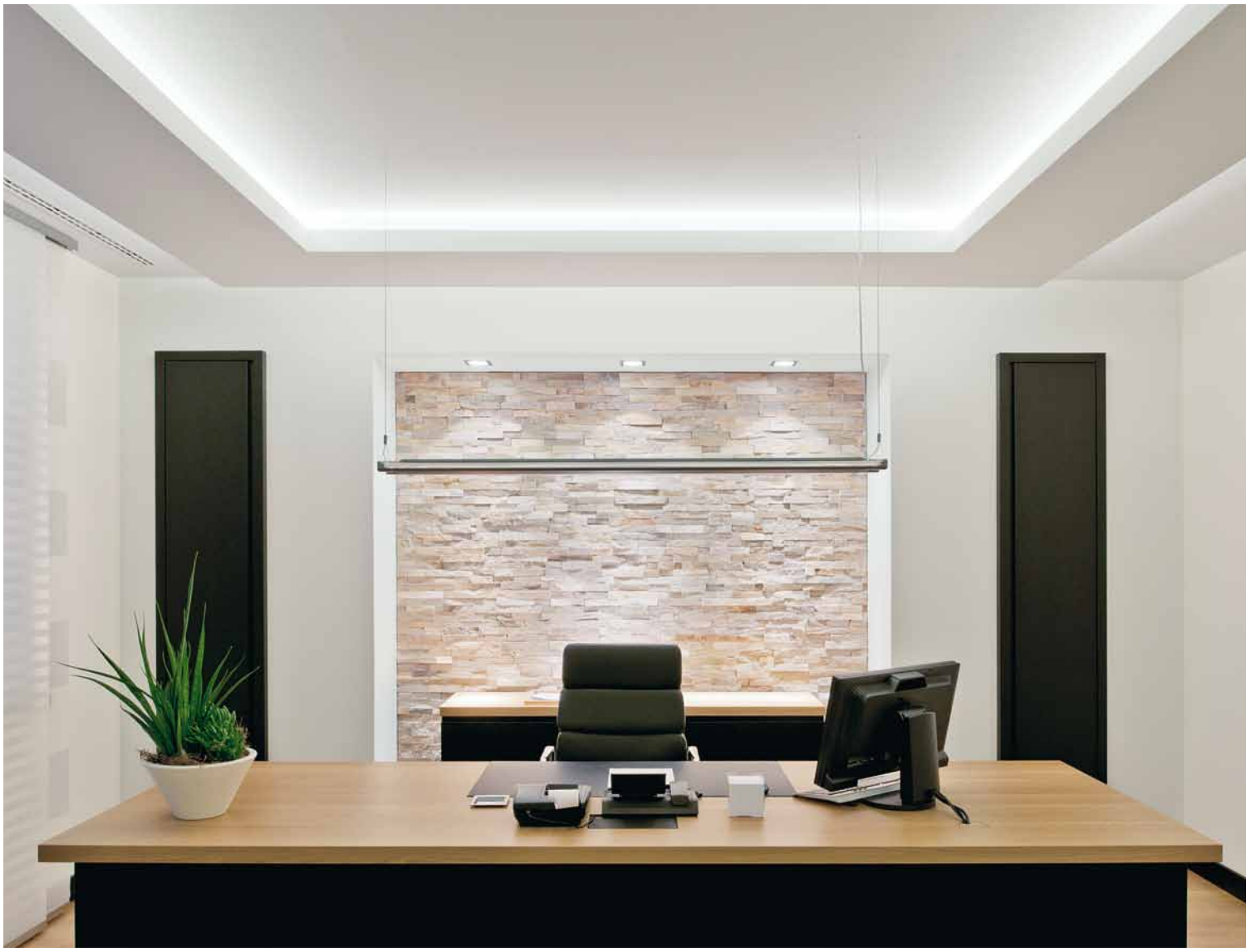
Recommended products

ONDARIA | Opal circular luminaire

LUXMATE LITENET | Lighting management

cabel, Empoli | IT
Architects: Arch. Massimo Mariani, Montecatini Terme | IT
Lighting solution: SLOTLIGHT light lines, PANOS downlights, MELLOW LIGHT recessed luminaires, TECTON continuous-row system, LIGHT FIELDS recessed luminaires, LEDOS LED recessed floor luminaires, LUXMATE LITENET lighting management system

2 Technology and flexibility
Bolstering activity



Schmidt Group, Coesfeld | DE
Architects: Kurt Hericks Architekturbüro, Coesfeld | DE
Lighting solution: OREA pendant luminaires, 2LIGHT MINI downlights,
LIGHTTOOLS lighting channel system

Hartung GmbH & Co. KG, Neumünster | DE
Lighting solution: PANOS INFINITY LED downlights, MELLOW LIGHT recessed luminaires, ELEEA pendant luminaires, ONDARIA circular luminaires, CRAYON LED downlights, DIMLITE lighting management system

- **Variable lighting solutions pave the way for creative, communicative working**
- **Modern lighting and room concepts preserve individuality and provide quiet areas where one can work without interruption**
- **The growing range of applications of electronic media is placing more exacting requirements on glare limitation**

Employees' tasks are becoming increasingly varied and purely desk-based work is often mixed in with creative, communicative tasks. This kind of office work which is stimulating thanks to its variety requires a flexible environment. The use of electronic media is increasing, which makes heavy demands on glare limitation.

Besides facilitating creative, communicative office work, it is also the task of the lighting system to assist individual activities and provide quiet areas where one can work without interruption. Both employees and their company benefit from a lighting management system that not only makes it possible to configure individual lighting situations but encourages people to do so thanks to intuitive operation.

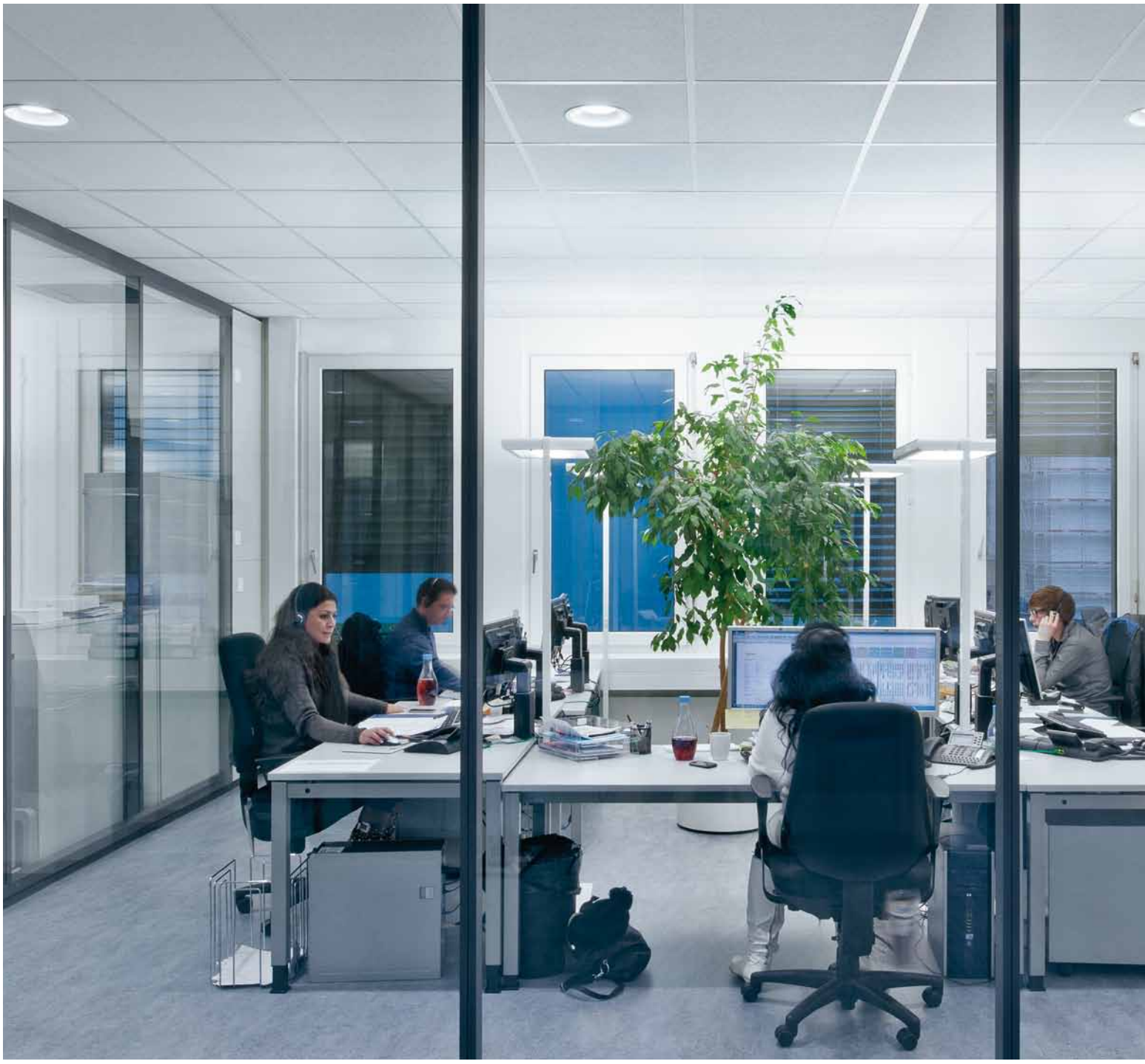
Inviting areas set aside for both formal and informal meetings make fresh demands on lighting, which is another argument in favour of using a variable, design-oriented lighting solution.

Recommended products

MELLOW LIGHT | Recessed luminaire

EMOTION | Lighting management

2 Technology and flexibility
Preserving individuality



Swisspro Group, Electrical engineering and building services | CH
Lighting solution: CAPA free-standing luminaires, LIGHT FIELDS recessed luminaires, PANOS INFINITY LED downlights

- **The subjectively best light can be set for each workplace at the push of a button**
- **Brightness and colour temperature are important factors for individual lighting**
- **Lighting management allows tailor-made lighting scenes and lets users interact with the building**
- **Zonal and activity-related lighting solutions are increasingly replacing uniform general lighting**

The desire for individuality explains why being able to configure a workplace to suit personal preferences is an option that is appreciated more and more. Even where several people work in a room, light can and should make its contribution towards improving the well-being of each employee. The brightness and colour temperature of a luminaire are decisive in this respect. The ability to control one's "own" luminaire as required makes any workplace more acceptable. Modern control points that simplify interaction between the user and the building are visible features of intelligent lighting control.

Rather than uniform general lighting, modern work environments include a lighting concept that divides space up into zones and, by doing so, caters for various types of use as well as the activities and needs of individual employees.

Recommended products

OPURA | Free-standing luminaire

CIRIA | Lighting management

2 Technology and flexibility
Being flexible

- **Lighting control systems ensure the ability to respond quickly and straightforwardly to modified room concepts**
- **Luminaire ranges that are highly flexible meet highly varied requirements while retaining a consistent design**
- **Blinds management protects against glare without breaking visual contact with the external environment**

Constant change is one distinctive feature of the modern world of work that is here to stay. Usage concepts and room layouts in offices have never before been as varied as they are today. In fact, it is quite possible for innovative lighting solutions to not only respond to changes but actually drive innovation as well. To achieve this, the ideal lighting concept combines luminaires that can be used flexibly with application-optimised lighting control. Luminaire ranges that combine dynamism with variety offer the right lighting solution to meet various requirements while retaining a consistent design look. If blinds as well as lighting are integrated into the control concept, this provides protection against glare while preserving visual contact with the external environment.

Numbers of staff and the office floor space available to them is another challenge that the future will bring. Architects and lighting designers have the task of safeguarding consistently high levels of furnishing quality despite shrinking available space. In the case of lighting, this can be accomplished by offering personal lighting scenes that meet individual requirements.

Recommended products

ELEEA | Pendant luminaire

LIGHT FIELDS LED | Recessed and surface-mounted luminaire

Hartung GmbH & Co. KG, Neumünster | DE
Lighting solution: PANOS INFINITY LED downlights, MELLOW LIGHT recessed luminaires, ELEEA pendant luminaires, ONDARIA circular luminaires, CRAYON LED downlights, DIMLITE lighting management system

Effectiveness and efficiency

“Making sustainable construction measurable and assessable – this is the goal of certification systems such as DGNB, LEED and BREEAM. The crucial challenge in optimising buildings is to enable user comfort and convenience using as little energy and as few resources as possible. Two things are decisive in achieving this: smart design and energy-efficient technologies.”

Dietmar Geiselmann, Dipl. Ing. M. Sc.
Transsolar Inc., Stuttgart and Munich | DE, New York | US

Ingenieurbüro Hausladen, Kirchheim | DE
Architects: Architekturbüro Udo Rieger, Isen | DE
Lighting solution: VAERO waveguide luminaires, SLOTLIGHT light lines, CLARIS louvre luminaires, 2LIGHT downlights, LUXMATE EMOTION lighting management system

Effective and efficient: balanced lighting solutions combine lighting quality with responsible use of resources. Comprehensive sustainability studies show that maximum CO_2 emission takes place during actual operation and a building achieves an excellent energy balance if the lighting is properly coordinated with other building services such as sun shading.

Luminaires that use innovative (LED) technology to produce light, limit glare and distribute light are, together with lighting management systems, the cornerstone of environmentally acceptable lighting concepts. Daylight-based control systems yield the biggest energy savings. Natural light has a positive impact on lighting quality. It is biologically effective, changes in tempo with nature, provides high light intensities and is available free of charge for many hours of the day.

Rigid structures are breaking down in the world of work in the 21st century; working in a fixed location for a predetermined number of hours is becoming an exception. This is where presence detectors offers additional scope for efficient lighting solutions. User-friendly interfaces and small groups of luminaires with appropriately allocated responsibilities ensure that adjustment according to individual preferences is possible. For in any automated system, a person acting in an environmentally-aware manner is demonstrably a crucial factor when it comes to using light efficiently.

3 Effectiveness and efficiency
Being sustainable

- **Sustainable construction pays for itself: property asset values are up to 35 % higher than those of conventional builds and energy consumption drops by 45 %**
- **Light makes a significant contribution towards the energy efficiency of a building**
- **An efficient lighting solution that takes into account human needs and economic aspects scores valuable points when it is time for a building to achieve sustainability certification**

The eco-balance reveals that a luminaire consumes 90 % of its energy when it is actually used. The biggest savings can therefore be obtained by selecting energy-efficient luminaires and using light carefully.

Environmentally compatible luminaires are characterised by their luminaire efficiency factor, dimmable ballasts and converters and the use of environmentally sustainable raw materials. Zumtobel documents all this data for each luminaire in an Environmental Product Declaration (EPD). The control concept chosen has a considerable impact on the sustainability of a lighting solution. The duty cycle and intensity of artificial lighting can be reduced in many ways: by need-based lighting, effective use of daylight, switching off lighting in areas and rooms that are not in use, linking luminaire control to blinds control and individual, intuitive intervention options that achieve high levels of user acceptance. The hallmarks of a sustainable lighting concept include zoning, maintenance optimisation, activity- and situation-related illuminance levels and defined dynamic lighting scenarios intended to encourage communication, concentration and relaxation.

Sustainability strengthens employee loyalty and makes an employer appear more attractive. It brings an agreeable working atmosphere and lighting makes an important contribution to this. Sustainability also involves coping flexibly with the faster pace at which office floor space is repurposed and layouts are modified. A property that is attractive in the long term is already geared up for future changes.

Recommended products

PANOS INFINITY | LED downlight

LUXMATE LIGHTING CONTROL | Daylight measuring head

LEED Platinum certified

Deutsche Bank, Frankfurt am Main | DE
Design architects: Mario Bellini Architects, Milan | IT
Project execution: gmp Architekten von Gerkan, Marg und Partner, Hamburg | DE
Lighting design: a·g Licht, Gesellschaft von Ingenieuren für Lichtplanung, Bonn | DE
Lighting solution: Special blade-shaped luminaire solution, SLOTLIGHT LED light lines, STARFLEX modular lighting system, LOGIC-S lighting system

3 Effectiveness and efficiency
Taking a holistic view

VHV, Hanover | D
Architects: Architekten BKSP, Hannover | DE
Lighting solution: SLOTLIGHT II light lines, SCUBA moisture-proof luminaires, PANOS down-lights, PHAOS wall and recessed floor luminaires, LINARIA and TECTON continuous-row systems, LIGHT FIELDS recessed luminaires, LUXMATE LITENET lighting management system

- **Integrated solutions cover all building services, functional and activity areas**
- **Interconnected building services simplify operation, maintenance and servicing**
- **Besides classic task areas, entrance, adjoining and outdoor areas also play an important role**

"Integrated" means taking care of all lighting tasks in an office besides conventional workplace lighting and meeting their particular requirements: whereas a visually attractive atmosphere may be called for in quiet areas, safe, functional lighting is the top priority in circulation areas. Lobby and reception areas benefit from an inviting lighting scene whereas conference rooms have to be able to adapt quickly and easily to various media. Besides classic office lighting, elements from application areas such as Shop & Retail and Hotel & Wellness can also be used. There is also the need to ensure optimum lighting in emergencies and when cleaning work is carried out.

Lighting and sun shading as well as heating, air conditioning, ventilation and façades all interact with each other. Building automation and office networks are also converging more and more in an integrated design process. In principle, there are two ways of ensuring that all systems in a building work together perfectly and do not interfere with each other: doing everything through one single system or using a special system for each building service. Zumtobel opts for the best solution in detail and uses standardised interfaces to efficiently connect lighting and blinds control to other building services and higher-level systems.

Recommended products

SLOTLIGHT II LED | LED light line

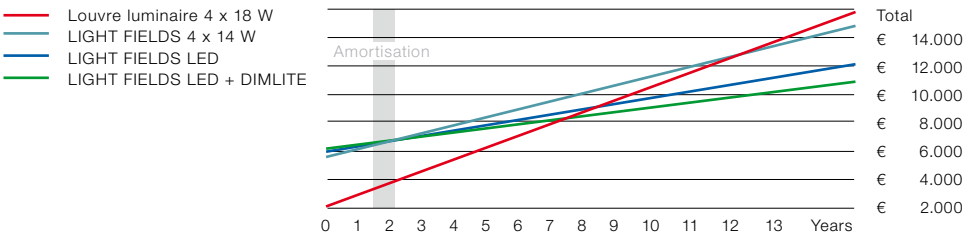
LUXMATE ED-SENS | Presence detector

3 Effectiveness and efficiency
Rational refurbishment

Wiener Städtische Insurance Group, Vienna | AT
Electrical design: Aquila Hausmanagement GmbH, Vienna | AT
Lighting solution: SLOTLIGHT II light lines, VAERO surface-mounted luminaires, LIGHT FIELDS LED recessed luminaires, LUXMATE lighting management system, ONLITE RESCLITE and ONLITE ARTSIGN emergency luminaires

- **Replacing obsolete lighting solution saves energy and maintenance costs and also cuts CO_2 emissions**
- **This investment pays for itself quickly, especially if combined with a lighting control system**
- **A modern lighting solution makes an employer seem more attractive and increases the value of a property**

Modern, efficient lighting solutions need not be confined to new buildings. Far from it: many existing buildings are now being renovated in order to cope with the growing demands employers face indealing with staff and using energy resources in a responsible manner. Replacing existing installations does not just offer an opportunity to switch to efficient luminaire technologies, it also provides a chance to implement contemporary lighting concepts. This makes it possible to boost lighting quality, improve the working atmosphere and make an employer seem more attractive. This increase in quality plus lower maintenance and operating costs add to the value of a property. The benefits of refurbishing lighting can be leveraged by using lighting control. The higher investment costs this entails are amortised within a short time thanks to reduced energy consumption.



The extra cost of refurbishment using the LIGHT FIELDS LED rather than the LIGHT FIELDS T16 luminaire pays for itself after only two years. Maximum long-term gains are achieved with additional lighting control.

Recommended products

LIGHT FIELDS LED | Recessed and surface-mounted luminaire

CREDOS | LED downlight

3 Effectiveness and efficiency
Added value thanks to LEDs

- **The already high efficiency and quality of LED lighting solutions are set to improve further still in future**
- **Because of their long service life, LED solutions also change several aspects of lighting design**
- **The higher cost of investing in an LED solution is quickly balanced out by lower operating costs. A life-cycle assessment demonstrates the advantages of LEDs in quantitative terms.**

Innovative LED lighting solutions offer the opportunity to team maximum energy efficiency and lighting quality with a sustainable lighting solution. The efficiency of LED luminaires is already well above 90 lm/W and continues to rise fast. LED enhancements in terms of quality such as Tunable White luminaires with variable colour temperatures and excellent colour rendering are being developed at a fast rate and are impossible to realise in equivalent fashion using conventional technologies. Another benefit: LED luminaires are generally dimmable and exploit this flexibility to full effect in order to obtain greater lighting convenience and lower energy consumption. Brightness can be adjusted to suit the amount of available daylight, a particular activity or ageing at any time. In professionally developed and designed systems, this results in greater sustainability thanks to smaller declines in luminous flux.

LEDs also require a complete rethink when it comes to design. A novel way of compensating for the age-related decline in luminous flux is needed because of their long service life. Lamps are no longer replaced but over-dimensioned so that, regardless of cleaning intervals, they achieve 70 % system luminous flux even after 50,000 hours. Zumtobel relies on constant luminance technology in order to avoid design mistakes and the need for premature refurbishment. A Maintenance Control function obviates the need to over-dimension the system in order to compensate for ageing as seen in conventional solutions and thus taps into considerable potential energy and cost savings.

Sustainably efficient decisions primarily concentrate on the entire life-cycle of a luminaire, not just on investment costs. Long-term potential savings become strikingly more obvious if one factors in dynamic trends such as rising electricity prices and if one realistically assesses the need to deal with maintenance processes in order to comply with qualitative lighting specifications.

ecoCALC

Comparing different lighting concepts to each other and calculating total costs and payback times: ecoCALC design software makes it possible to audit the sustainability of lighting solutions and refurbishment projects quickly.

Alexander Bürkle GmbH & Co. KG, Freiburg | DE
Architects: Freyler Industriebau GmbH, Kenzingen | DE
Lighting solution: CRAYON LED special luminaires,
TECTON continuous-row system

Lighting management
Intelligent networks for offices and communication

A lighting control system is the only way to get all the benefits of a modern lighting solution. Lighting management has an impact on aspects such as ergonomic factors, economic efficiency and safety.

Experience clearly demonstrates that only employees who feel at ease and can accomplish their visual tasks perfectly achieve maximum productivity. Office areas with large window frontages and office areas that are used in different ways make huge demands on a lighting solution as well. LUXMATE control systems incorporate many components and functions that have been used successfully in office applications for many years. Zumtobel's service department is available to carry out design, commissioning and, on request, reliable maintenance.

Ergonomic thanks to dynamic lighting
Lighting that mimics daylight in terms of colour temperature and intensity makes people feel safer and more at ease. Staff in areas where there is little daylight derive particular benefit from such lighting. When used in combination with appropriate luminaires, LUXMATE lighting controls create perfect lighting conditions for an extremely wide variety of activities.

Saving energy
Lighting control provides a variety of ways of saving energy: even simple presence-based lighting control or a calendar with adjustable timeslots boosts the efficiency of a lighting solution. Using daylight provides the biggest scope for potential savings. Combined control of lighting and blinds teams the benefits of daylighting with the comfort of glare limitation.

Ensuring safety
Zumtobel offers a unique way of combining general lighting management systems with an emergency lighting system. For instance, LUXMATE LITENET is used to monitor emergency and escape sign luminaires that are powered by an ONLITE central battery system.

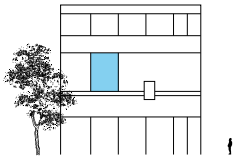
Greater empowerment
A lighting control system gives users the chance to modify default settings to suit their own preferences and ideas. This freedom to make changes to suit personal taste creates a sense of ease and therefore improves employee motivation. For instance, for some users staying in touch with the outdoor environment is more important than using shutters etc. to protect against glare.

Power Tower, corporate headquarters of Energie AG, Linz | AT
Architects: Kaufmann und Partner, Linz | AT
Lighting solution: LUXMATE LITENET lighting control system, ONLITE CPS emergency lighting monitoring system, PANOS Q downlights, PERLUCE luminaires with extra protection

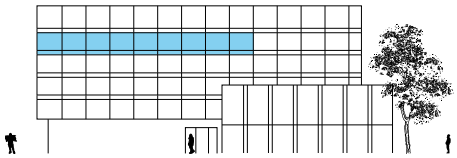
Energie AG's Power Tower with daylight measuring head for building-wide LUXMATE LITENET lighting control

Overview of lighting control products

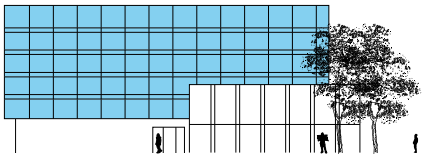
LUXMATE DIMLITE
Lighting management for individual rooms



LUXMATE EMOTION
Lighting management for several rooms



LUXMATE LITENET
High-end room management system with lighting and blinds control



Operation

CIRCLE Tune control point
The same size as a standard momentary-action switch, the CIRCLE control point provides three lighting scenes at the push of a button – and the option of varying light intensity and colour temperature

CIRIA control point
More than 20 different lighting scenes can be programmed and called up as required using the multifunctional CIRIA control point

INCONTROL software
This software enables employees to control all luminaires and blinds directly from their PC or smart phone

Sensors and automatic controllers

Daylight measuring head
The daylight measuring head captures sky conditions and uses them to calculate the optimum settings for the entire building

Daylight sensor
The LUXMATE Look Out sensor directly faces the window and is used to precisely match artificial lighting to the available daylight

Presence detector
The LUXMATE sensor reliably captures movements in a room with high resolution and great sensitivity

Maintenance control
Zumtobel uses the software-based Maintenance Control function to prevent age-related declines in brightness

Tunable White automatic controller
With the latest generation of LITENET devices, the colour temperature of lighting can be varied in accordance with a proposed timeline or be varied individually throughout the entire building

Emergency lighting
Inconspicuous in day-to-day life – reliable in an emergency

Inspiringly diverse

High-end design runs through Zumtobel's versatile ONLITE luminaire product range like a common thread. The luminaires can be powered, controlled and monitored centrally or locally. Easy installation and commissioning as well as low power and maintenance requirements keep both investment and operating costs down.

Prestigious, functional design

Ecologically compatible and energy efficient

Economically efficient complete solution

Ropemaker Place, London | GB
Architects: Arup Associates, London | GB
Escape sign luminaires: ONLITE ARTSIGN, PURESIGN and PROOFSIGN

In cooperation with renowned design firms, Zumtobel develops escape sign and emergency luminaires that blend harmoniously into the architecture of a building. Choosing high-grade materials not only improves aesthetic appearance, it also extends the service life of products.

ONLITE ARTSIGN
The smallest escape sign luminaire in the ONLITE range offers maximum reliability and efficiency. High-output power LEDs which are absolutely maintenance-free and boast a long service life ensure a recognition range of 15 m.

Design by Matteo Thun

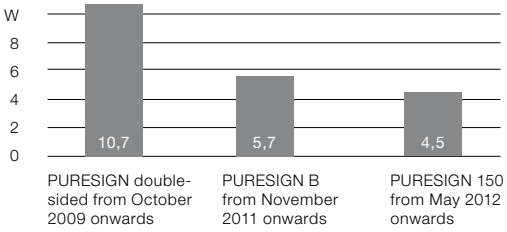
ONLITE COMSIGN 150
This elegant escape sign luminaire is characterised by transparent acrylic glass and anodised aluminium. Innovative LED technology and a recognition range of 30 m are additional features.

Design by EOOS

ONLITE PURESIGN 150
A frame made of special aluminium, a low mounting height and a recognition range of 30 m – these are the external dimensions of the slime-line PURESIGN. Inside the escape sign luminaire, state-of-the-art LED and lighting technology is used.

Design by EOOS

Equipped with the latest LED technology, the new generation of ONLITE luminaires achieves energy efficiency levels in excess of 100 lm/W. Their energy consumption of 4.5 W results in energy savings of up to 60 %.



Low operating costs are an especially important issue in large office buildings. When it comes to emergency lighting, these costs can be sustainably reduced by energy-efficient LED technologies and optimised electronics. Using ONLITE systems ensures quick and easy configuring, commissioning and testing of all escape sign and emergency luminaires.

ONLITE central CPS
Emergency lighting systems with central power supply

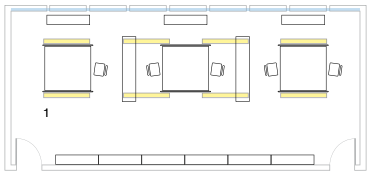
Building on a modular system, Zumtobel adapts every central-battery system to meet customers' exact project-specific needs. Each DALI luminaire in a central-battery system can be used as a separately monitored and individually controlled emergency luminaire. Other advantages of DALI-based communication: minimum maintenance effort, fail-safe data communication and no need for additional communication modules in luminaires

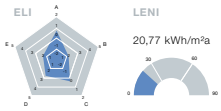
Lighting solutions
Human Aspects + Energy Efficiency = Humanergy Balance

Team office

In offices, energy-efficient lighting does not imply any reduction whatsoever in lighting quality. Zonal lighting concepts save energy and leave spare funds to spend on additional lighting components for vertical surfaces. An intelligent control system coordinates all the various lighting components in line with the amount of available daylight or the presence of employees. This makes it possible to achieve significant reductions in actual energy consumption.

Basic



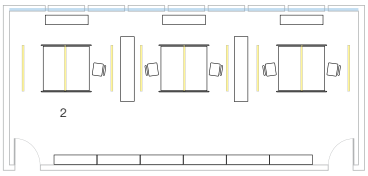


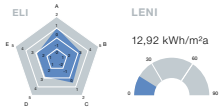
- ELEEA louvre luminaires [1], indirect/direct light distribution

Lighting quality
– Direct/indirect lighting ensures pleasant visual conditions in a room

Energy efficiency
– Lighting using louvre luminaires projects light efficiently onto the task area with relatively little loss

Standard



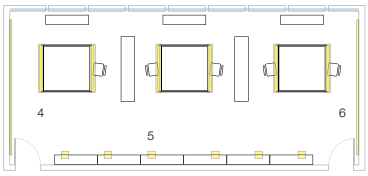


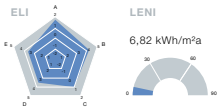
- ECOOS MPO luminaires [2], indirect/direct light distribution
- DIMLITE Single lighting management system [3]

Lighting quality
– Lighting is virtually completely glare-free thanks to a microprismatic optic
– All-round 360° light emission creates a friendly vista
– Architectural arrangement of luminaires at right angles to the windows is in alignment with the axes of a building

Energy efficiency
– Shifting lighting emphasis in favour of the direct light component has a positive effect on energy consumption
– Manual dimming of lighting opens up scope for further potential savings

Optimal





- LIGHT FIELDS LED luminaires [4]
- PANOS INFINITY LED downlights [5]
- TECTON Tetris continuous-row system [6]
- LUXMATE EMOTION lighting management system [7]

Lighting quality
– With an axis-oriented arrangement, direct/indirect light offers balanced luminances in a room
– Additional illumination of vertical surfaces makes a room look larger and also has a biological effect

Energy efficiency
– Time-based control reduces the actual energy consumption of lighting

(1)


(2)


(3)


(4)


(5)


(6)

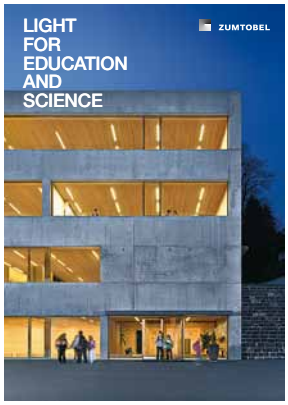

(7)


Underlying conditions: team office, 12.5 m x 5 m, 8 hours/day, 250 days/year

ELI Ergonomic Lighting Indicator — Lighting quality assessed on the basis of five criteria: A visual performance | B vista | C visual comfort | D vitality | E empowerment
LENI Lighting Energy Numeric Indicator — Annual energy consumption in kWh per square metre, based on EN 15 193

HDI Gerling, Hannover | DE
Architects: ingenhoven architects, Düsseldorf | DE
Lighting solution: ECOOS pendant luminaires, PERLUCE moisture-proof luminaires, MIRAL louvre luminaires, LINARIA light lines, ONLITE RESCLITE emergency luminaires

zumtobel.com/office



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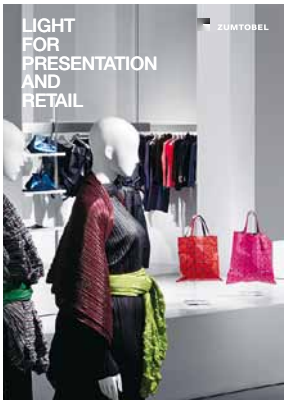
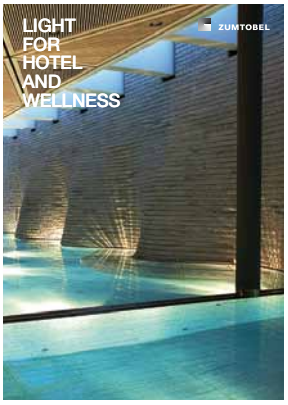


zumtobel.com/shop



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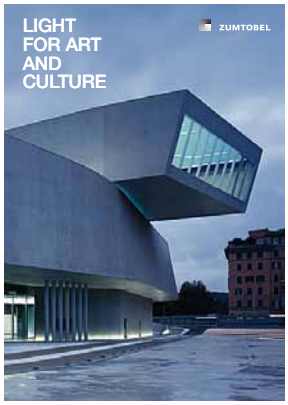
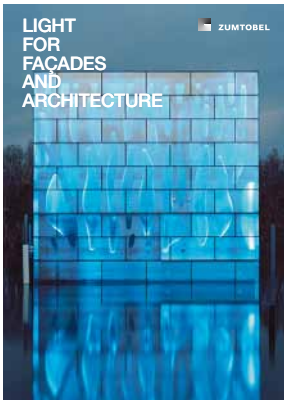


zumtobel.com/culture

zumtobel.com/healthcare

zumtobel.com/industry



zumtobel.com/facade

Zumtobel is the internationally leading supplier of integral lighting solutions for professional interior and exterior lighting applications.

- Offices and Communication
- Education and Science
- Presentation and Retail
- Hotel and Wellness
- Art and Culture
- Health and Care
- Industry and Engineering
- Façades and Architecture

We provide unique customer benefits by integrating technology, design, emotion and energy efficiency. Under the Humanergy Balance concept, we combine the best possible ergonomic lighting quality for an individual's well-being with the responsible use of energy resources. The company's own sales organisations in twenty countries, as well as commercial agencies in fifty other countries, form an international network of experts and design partners providing professional lighting consulting, design assistance and comprehensive services.

Lighting and sustainability

In line with our corporate philosophy "We want to use light to create worlds of experience, make work easier and improve communications and safety while remaining fully aware of our responsibility to the environment", Zumtobel offers energy-efficient high-quality products, while at the same time making sure that our production processes based on the considerate use of resources are environmentally compatible.

zumtobel.com/sustainability

5
YEAR GUARANTEE

Top quality – with a five-year guarantee.
As a globally leading luminaire manufacturer, Zumtobel provides a five-year guarantee for its complete product range with effect from 1 April 2010.

zumtobel.com/guarantee

Order no. 04 924 350-EN 04/12 © Zumtobel Lighting GmbH
Technical data was correct at time of going to press.
We reserve the right to make technical changes without notice. Please contact your local sales office for further information. For the sake of the environment: Luxo Light is chlorine-free paper from sustainably managed forests and certified sources.

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print production

PEFC
www.pefc.org PEFC/06-38-214

ZUMTOBEL

Track and spots

Downlights

Wall-mounted luminaires

Recessed luminaires

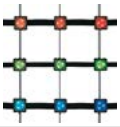
Surface-mounted and pendant luminaires

Free-standing luminaires

Continuous-row system, individual batten luminaires and modular lighting systems

High-bay luminaires and floodlight reflector systems

Luminaires with extra protection



Building facades and media luminaires

Lighting management system

Emergency lighting

Medical supply systems

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